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URANIUM AND THORIUM SORPTION ON MINERALS STUDIED BY X-RAY ABSORPTION SPECTROSCOPY

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Several actinide-mineral sorption systems were studied by uranium and thorium L_3-edge x-ray absorption spectroscopy. A series of layer silicate minerals, including micas, were selected for their systematic variations in surface structure, e.g. degree of permanent negative charge on the basal planes. An expansible layer silicate, vermiculite, was treated to provide several different interlayer spacings, allowing variations in the accessibility of interior cation exchange sites. The finely powdered minerals were exposed to aqueous solutions of uranyl chloride or thorium chloride. Analysis of the EXAFS and XANES spectra indicates the influence of the mineral substrate upon the local structure of the bound actinide species. Trends in the data are interpreted based upon the known variations in mineral structure.

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